Which one is different?

Suggested grade level: K, 1 or 2

Corresponding software: *Mathville Kidway, Pick a Winner* activity

Curriculum expectations addressed:

Number sense:

* Count and recognize “how many” in sets of objects

Patterning & Algebra:

* Recognize similarities and differences in a variety of attributes
* Identify attributes and rules in presorted sets
* Recognize numeric and non-numeric patterns such as shapes

Geometry:

* Compare, sort and classify 2 and 3-D shapes
* Explore informally symmetry
* Recognize slides, flips and turns

Communication:

* Organize and consolidate mathematical thinking through communication
* Communicate mathematical thinking coherently and clearly to peers and teachers

Prerequisites: Comparing, sorting and classifying activities with manipulatives and concrete objects

Materials required: Copies of the following worksheet (black and white copies are fine) and pencils

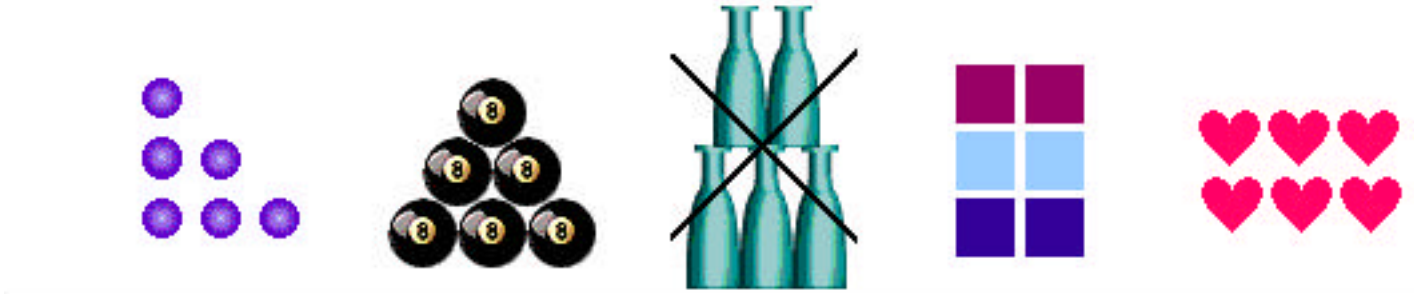
Suggestions for use: This is best done as a small group activity with groups of 2, 3 or 4. A key part of this activity is that students should discuss the reasoning behind their choices and come to an agreed upon group decision.

Encourage students to explain to you and to each other what is the SAME about the other four choices; pose the questions, “How are these alike?” and “What rule do they all follow?” Have them go through the choices one by one and point out what is alike about four of them and what is different (“How does it break the rule?”) about the one they have crossed out.

Variations and extensions: Ask students to make up a replacement for the different choice that’s the **same** as the four others. Challenge the students to create their own examples. Try different themes (food, animals, sports, letters, number groups, etc.).

Which one is different?

In each set of five, cross out the one that's different. Here is an example:



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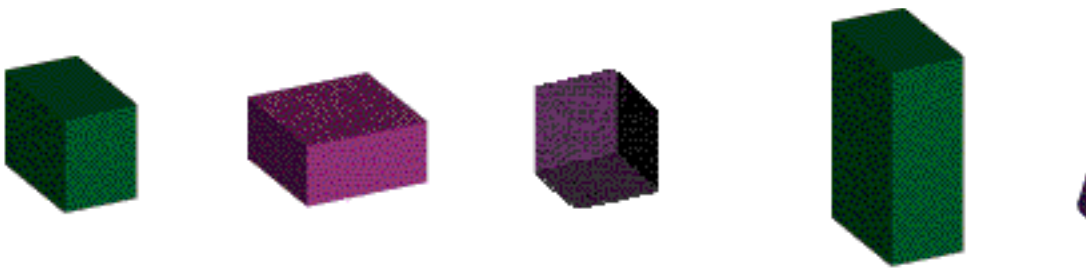
9. 

10.

Answer Key

Which one is different?

There may be more than one correct answer. EXPLAIN your choice to your teacher and the other students.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Draw the missing picture.

Suggested grade level: K, 1 or 2

Corresponding software: *Mathville Kidway, Pick a Winner* activity

Curriculum expectations addressed:

Patterning & Algebra:

* analyze how both repeating and growing patterns are generated
* Recognize, describe & extend numeric and non-numeric patterns and translate from one representation to another

Geometry:

* Compare, sort and classify 2 and 3-D shapes
* Recognize and apply slides, flips and turns

Communication:

* Organize and consolidate mathematical thinking through communication
* Communicate mathematical thinking coherently and clearly to peers and teachers

Prerequisites: Ordering and counting activities with manipulatives and concrete objects; physical experiences and experiments with slides, turns and flips

Materials required: Copies of the following worksheet (black and white copies are fine) and pencils

Suggestions for use: This may be done individually, in small groups or as a large group discussion. A key part of this activity is that students explain why they have drawn a particular picture. Ask “How do you know that this is the missing picture?”

If there is more than one candidate for the missing picture, encourage a group discussion, with students explaining why they agree with one choice or another.

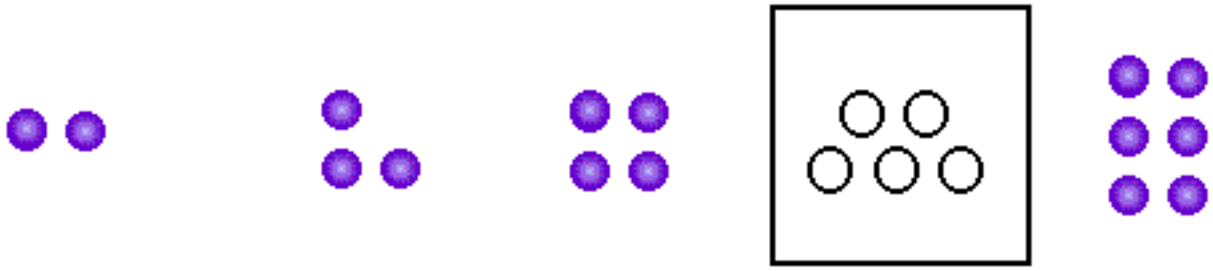
If the student or group is “stumped”, present the answer with an explanation and then continue with the next term in the pattern or give another similar example, asking the students to draw the next missing picture.

Variations and extensions: Challenge the students to create their own examples. Try different themes (food, animals, sports, letters, number groups, etc.).

Save the worksheets and later have each student use little “post it” notes to cover one item in each sequence. They then exchange worksheets and do the activity again, drawing the missing pictures on the “post it” notes. Students can then check their work by looking under the notes.

Draw the missing picture.

Example:



1.

2.

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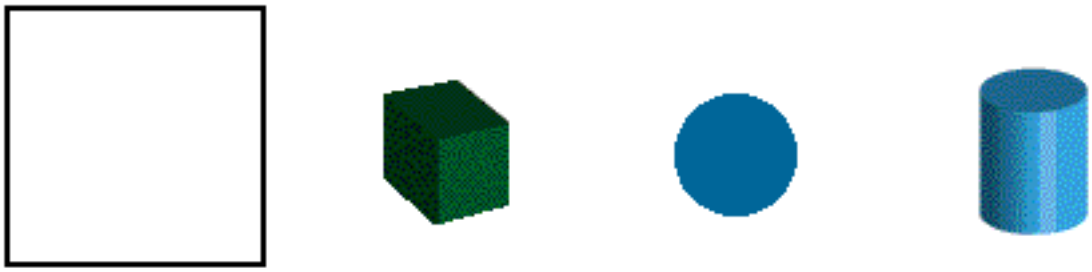
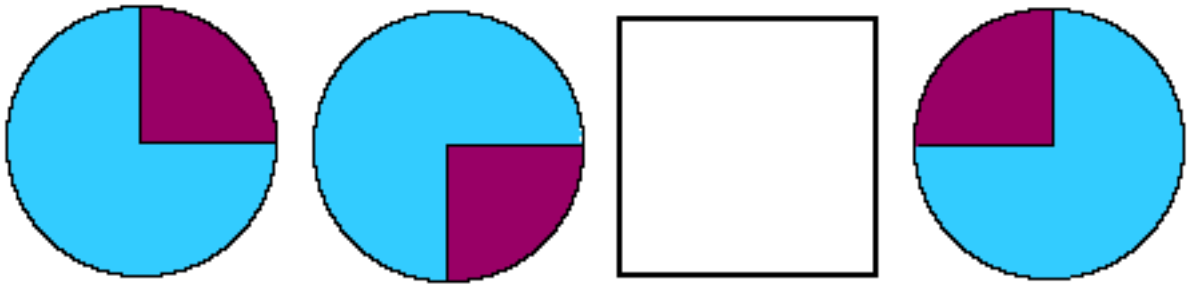
4.

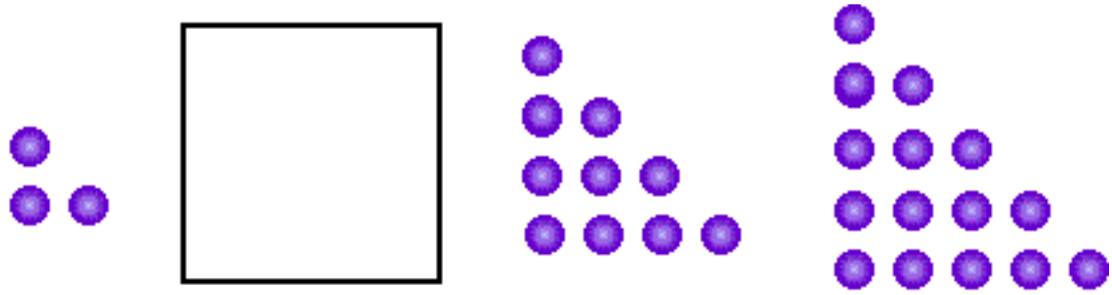
Student Worksheet 2 of 2

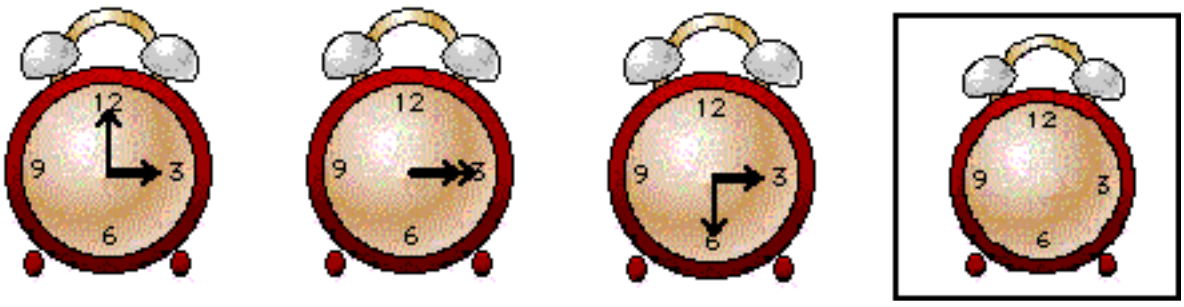
5.

6.

7. 

8. 

9. 

10. 

Answer Key

Draw the missing picture.

Explain WHY the picture you drew is the missing picture.

1.

2.

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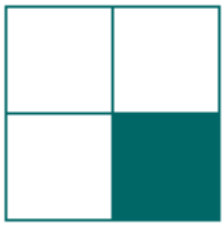
4. 

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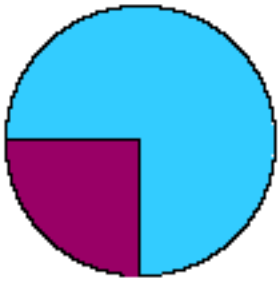
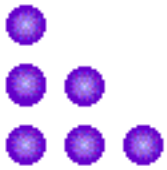
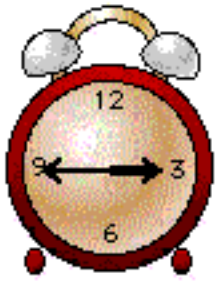
8. 

9. 

10. 

Relations

Suggested grade level: 2, 3 or 4

Corresponding software: *Mathville Speedway*, *Relation Shapes* activity

Curriculum expectations addressed:

Algebra

* Extend patterns involving geometric shapes and transformations such as flips and turns

Geometry:

* Identify, compare and analyze 2-dimensional shapes according to two attributes

Communication:

* Organize and consolidate mathematical thinking through communication
* Communicate mathematical thinking coherently and clearly to peers and teachers

Prerequisites: Classifying activities and activities that explore flips, slides and turns with manipulatives and concrete objects

Materials required: Copies of the following blackline worksheet and pencils

Suggestions for use: Four sets of worksheets follow. The first is intended as a warm-up activity to familiarize students with the "A is to B as C is to ?" format of the other three worksheets.

This may be done as an individual or small group activity with groups of 2 or 3. A key part of this activity is that students should discuss their reasoning with the teacher or the rest of the group.

Encourage students to explain how the first two items are related and have them check that the second two items are related in the same way.

Variations and extensions: Challenge the students to create their own relationships worksheets. Try different themes (flips, turns, word themes, sports, science, etc.).

A two-person activity: Draw each answer on a card. Shuffle the deck. Player A draws a card (only Player A can see it). Player A must now help Player B guess what's on the card by thinking of and drawing three shapes (or words) on a piece of paper. Player B looks at the three shapes and draws a fourth shape. If the fourth shape matches what's on the card, the players switch roles, with Player B drawing the card; otherwise Player A must try again, drawing three more shapes, until Player B succeeds in guessing what's on the card.

Relations - 1

Fill in the missing words.

1. **Quick** is to **slow** as **young** is to _____.
2. **Finger** is to **hand** as **toe** is to _____.
3. **Ford** is to **car** as _____ is to **running shoes**.
4. **No** is to **know** as **too** is to _____.
5. **Day** is to **night** as **winter** is to _____.
6. **Hand** is to **glove** as **foot** is to _____.
7. **Stick** is to **hockey** as _____ is to **baseball.**
8. **Lake** is to **pond** as _____ is to **stream.**
9. **French** is to **France** as _____ is to **Spain.**
10. **Two** is to **bicycle** as **four** is to _____.
11. **Ten** is to **five** as **six** is to _____.
12. **Watch** is to **time** as **thermometer** is to _____.
13. **Old** is to **new** as _____ is to _____.
14. **Cow** is to **calf** as _____ is to _____.
15. **Boat** is to **water** as _____ is to _____.

Answer Key

Relations - 1

There may be more than one correct answer. EXPLAIN your answer to your teacher and the other students.

1. Quick is to slow as young is to **old.**

2. Finger is to hand as toe is to **foot.**

3. Ford is to car as **Nike, Adidas, Puma, etc.** is to running shoes.

4. No is to know as too is to **two, to.**

5. Day is to night as winter is to **summer.**

6. Hand is to glove as foot is to **shoe, sock**.

7. Stick is to hockey as **bat** is to baseball.

8. Lake is to pond as **river** is to stream.

9. French is to France as **Spanish** is to Spain.

10. Two is to bicycle as four is to **car, wagon, etc.**

11. Ten is to five as six is to **three, one.**

12. Watch is to time as thermometer is to **temperature.**

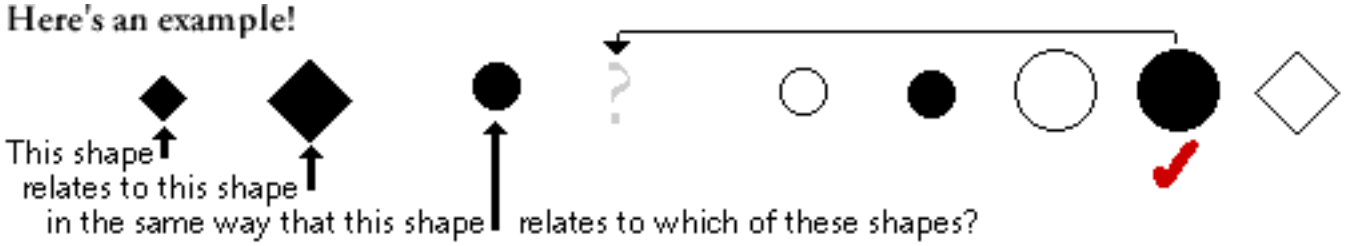
13. Old is to new as **up** is to **down. (lots of possibilities)**

14. Cow is to calf as **cat** is to **kitten. (lots of possibilities)**

15. Boat is to water as **car** is to **road. (lots of possibilities)**

Relations - 2

Here's an example!



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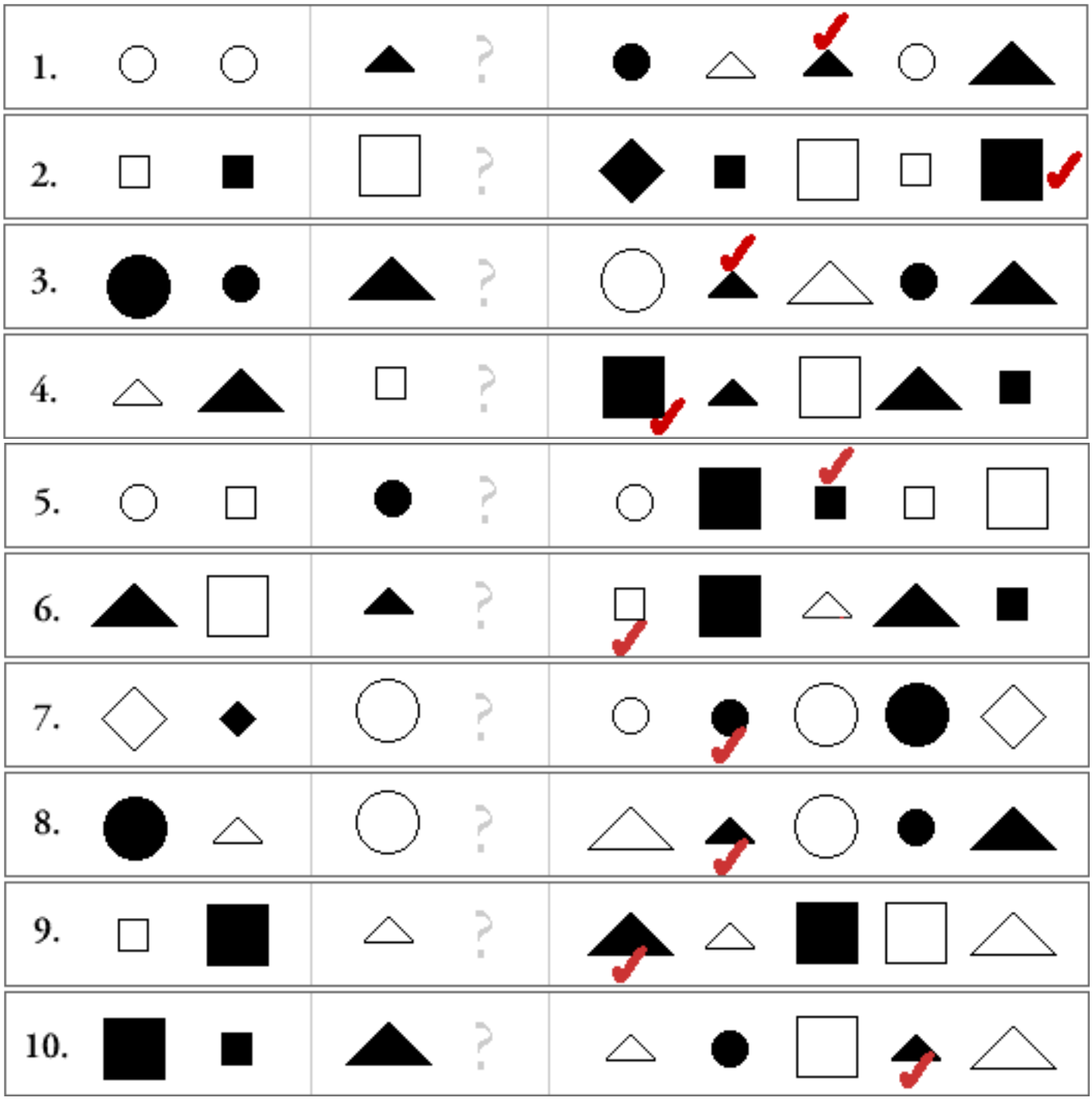
10.		?	

Answer Key

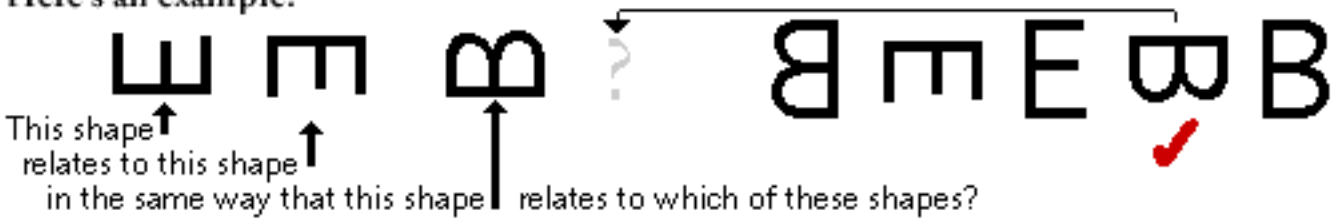
Relations - 2

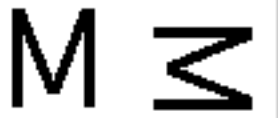
EXPLAIN your answer to your teacher and the other students.



Relations - 3

Here's an example!



1.			
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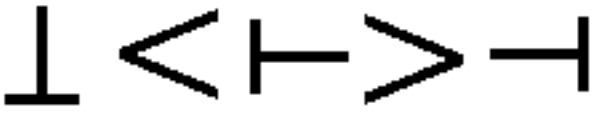
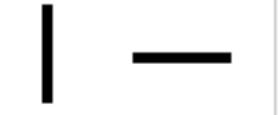
5.			
6.			
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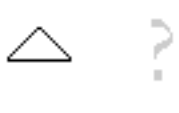
9.			
10.			

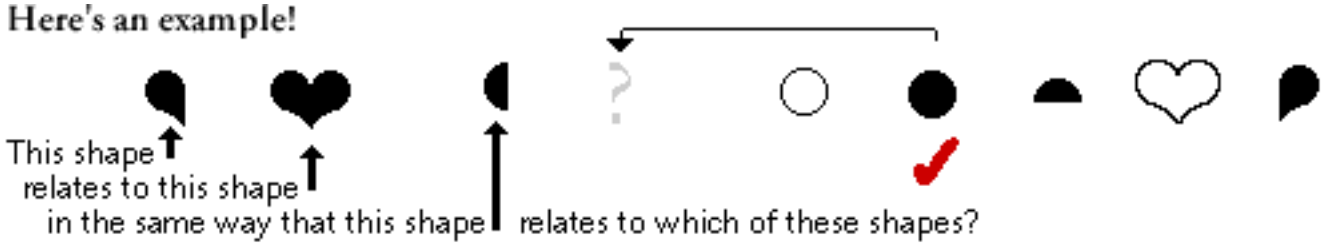
Answer Key

Relations - 3

EXPLAIN your answer to your teacher and the other students.

Relations - 4

Here's an example!



1.

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7.

8.

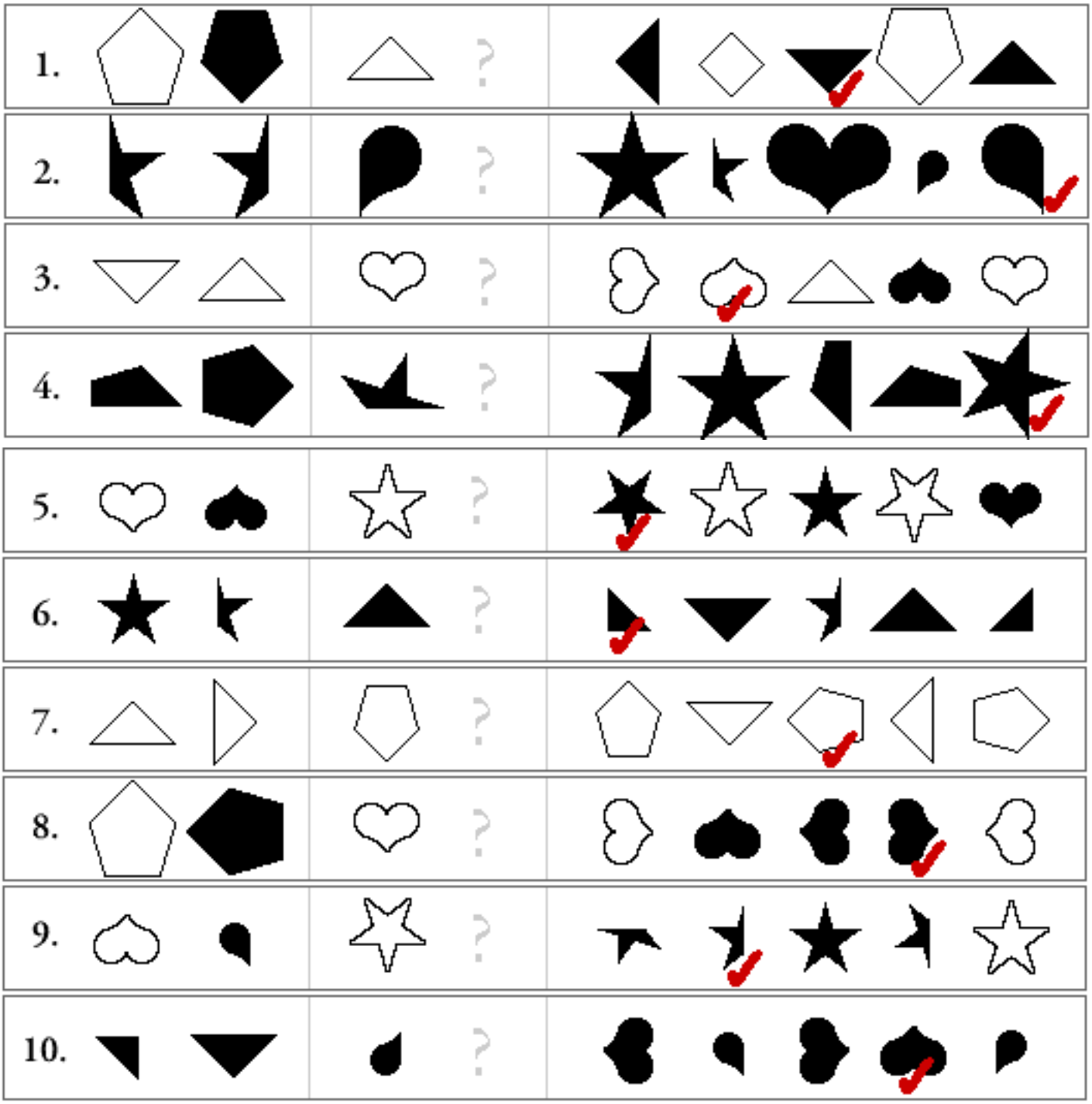
9.

10.

Answer Key

Relations - 4

EXPLAIN your answer to your teacher and the other students.



Metric Concentration

Suggested grade level: 5, 6 or 7

Corresponding software: *Mathville Starway*, *Metriconversion* activity

Curriculum expectations addressed:

Measurement:

* understand metric prefixes, units and symbols
* estimate, measure and record lengths
* calculate rectangular areas
* apply appropriate techniques, tools and formulas to determine measurements

Geometry:

* constructing tiling patterns (tessellations) to cover a plane

Prerequisites: Measuring activities with metric units, discussion and demonstrations of tessellations

Materials required: Copies of the following worksheet, cardboard or paper and metric rulers and tape measures

Suggestions for use: This can be done as a small group activity with groups of 2 to 5. Once the deck(s) have been created, the Concentration game may be played with pairs, small groups or as a solitaire game.

Variations and extensions:

Have students create new decks using metric **mass** units (g, kg, mg, etc.) and different tiling patterns. The number of cards and ALL the faces are up to be determined by the students.

Create a deck using metric sports data (current world pole vault record, reigning Olympic men's 100 m dash champion, length of the race sometimes called the "metric" mile, distance that must be backstroked in the 400 m individual medley swimming event, etc.)

Have students experiment with the shapes of the cards: suggest M. C. Escher designs, alphabet shapes, more than one shape, etc.

Have students face new challenges and check the work of other groups at the same time by playing several rounds of Concentration with a deck created by **another** group.

Metric Concentration

Design a set of 20 cards:

The size, shape, and design on the backs of the cards is up to you, with **one condition**: when you lay out the cards, they must tile the plane (fit together without gaps or overlaps).

Write on the faces of 10 of the cards:

- The diameter of a penny in mm
- The radius of a CD-ROM in cm
- The length of a pencil in cm
- The length of a sheet of paper in cm
- The height of a student in cm
- The width of a classroom in m
- The perimeter of a classroom in m
- The area of a sheet of paper in square cm
- The area of a table top in square m
- The floor area of a classroom in square m

Create 10 matching cards by measuring the diameter of a penny, the radius of a CD-ROM, etc. and writing the measurement on a card face. Don't forget to include the unit names (mm, cm, etc.)

Use your deck to play a game of Metric Concentration:

a) Shuffle the deck and lay out the cards face down
b) Each player turns 2 cards face up. If the cards match, the player collects them; if not, they are turned face down.
c) Continue until all cards have been collected. The player with the most cards wins.

Not your Usual Box

Suggested grade level: 6, 7

Corresponding software: Mathville Middle School, Work - Warehouse

Curriculum expectations addressed:

* Construct three-dimensional figures from nets
* Draw nets for three-dimensional figures
* Investigate properties of pyramids and cylinders
* Scale two-dimensional figures

Prerequisites: general familiarity with three-dimensional figures and their nets Have the students complete the **Nets "Warm-up"** on the next page.

Materials required: cardboard, wrapping paper, glue or tape, scissors

Suggestions for use: The purpose of the project is to create a set of unique gift boxes using the worksheets that follow according to these directions:

1. Scale the tabbed nets on each of the four worksheets (Worksheets 2 to 5) to create a set of patterns. Enlarge by a factor of 2 or 3 or whatever a student may choose.
2. Use each scaled net as a pattern to cut out a cardboard net and a matching wrapping paper net.
3. Glue or tape the cardboard net and the wrapping paper together.
4. Fold the net and decide which face or faces to leave unglued to form the box opening.
5. Glue or tape the other faces together, using the tabs, to form a "box" that's not shaped like a conventional box.

Variations and extensions: Ask students to create three new boxes completely on their own, one shaped like a square pyramid, one like a pentagonal prism and one like a pentagonal pyramid. Instruct the students to look carefully at the nets and consider the following: What do the prism nets have in common? What do the pyramid nets have in common? What is the main difference between the prism nets and the pyramid nets?

Nets “Warm-up”

Fill in the blanks or complete the sentences:

1. The net of a triangular prism consists of ____ triangles and 3 _____ .

2. The net of a square prism consists of ____ squares and 4 _____ .

3. The net of a pentagonal prism consists of ___ pentagons and ____ _____ .

4. The net of a _____ prism consists of 2 hexagons and 6 _____ .

5. The net of an octagonal prism consists of

6. The net of a square pyramid consists of a square and 4 _____ .

7. The net of a pentagonal pyramid consists of a _____ and 5 _____ .

8. The net of a hexagonal pyramid consists of _____ .

9. The net of a rectangular pyramid consists of _____ .

10. Triangle is to pyramid as rectangle is to_____ .

Sketch:

11. the net of a cube. Check your answer by cutting out and folding the net.

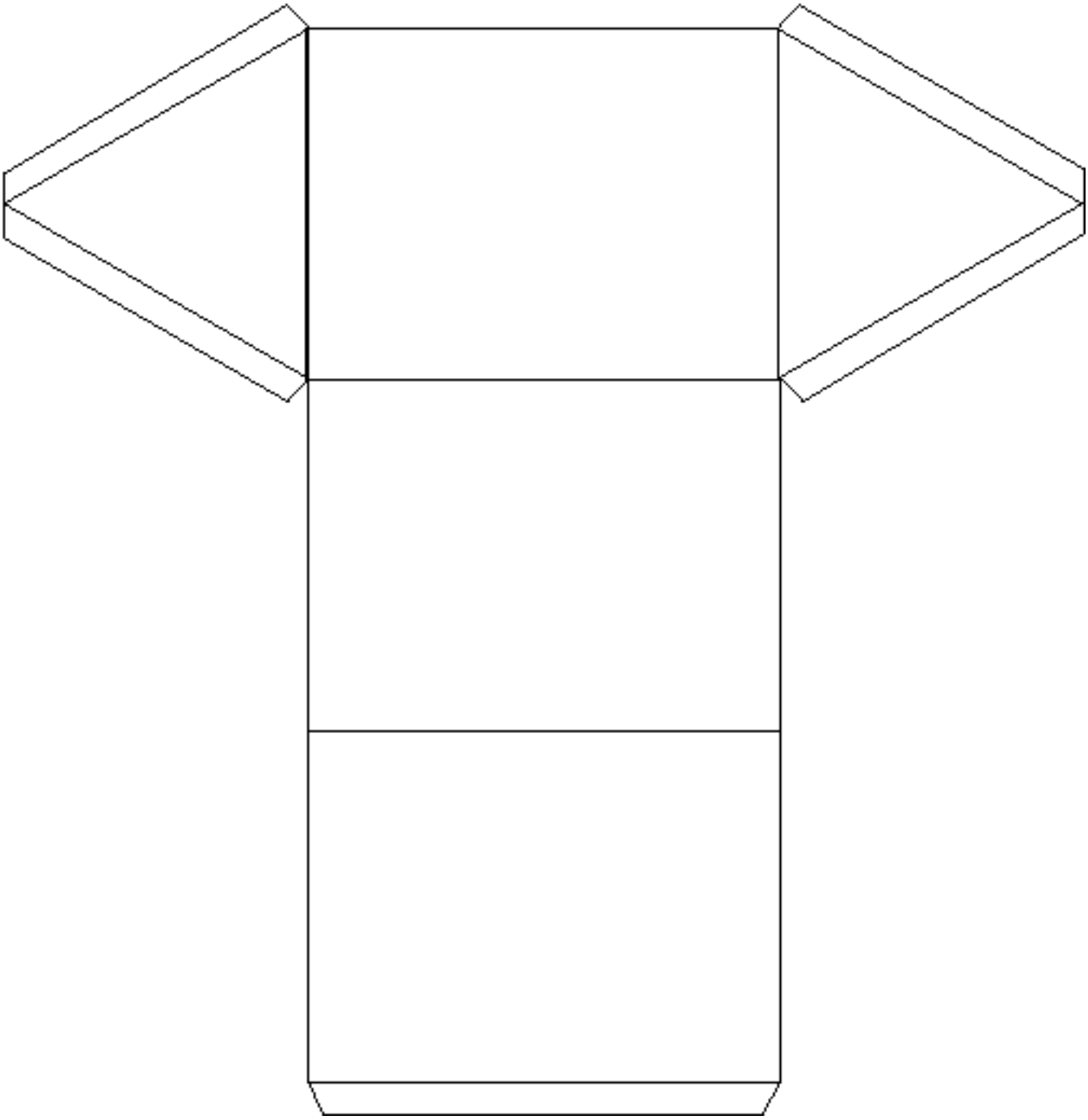
12. the net of a cube with two red faces opposite each other, two blue faces opposite each other and two yellow faces opposite each other. Check your answer by cutting out and folding the net.

13. two DIFFERENT nets that both form the SAME rectangular prism. Check your answer by cutting out and folding the nets and comparing the two shapes.

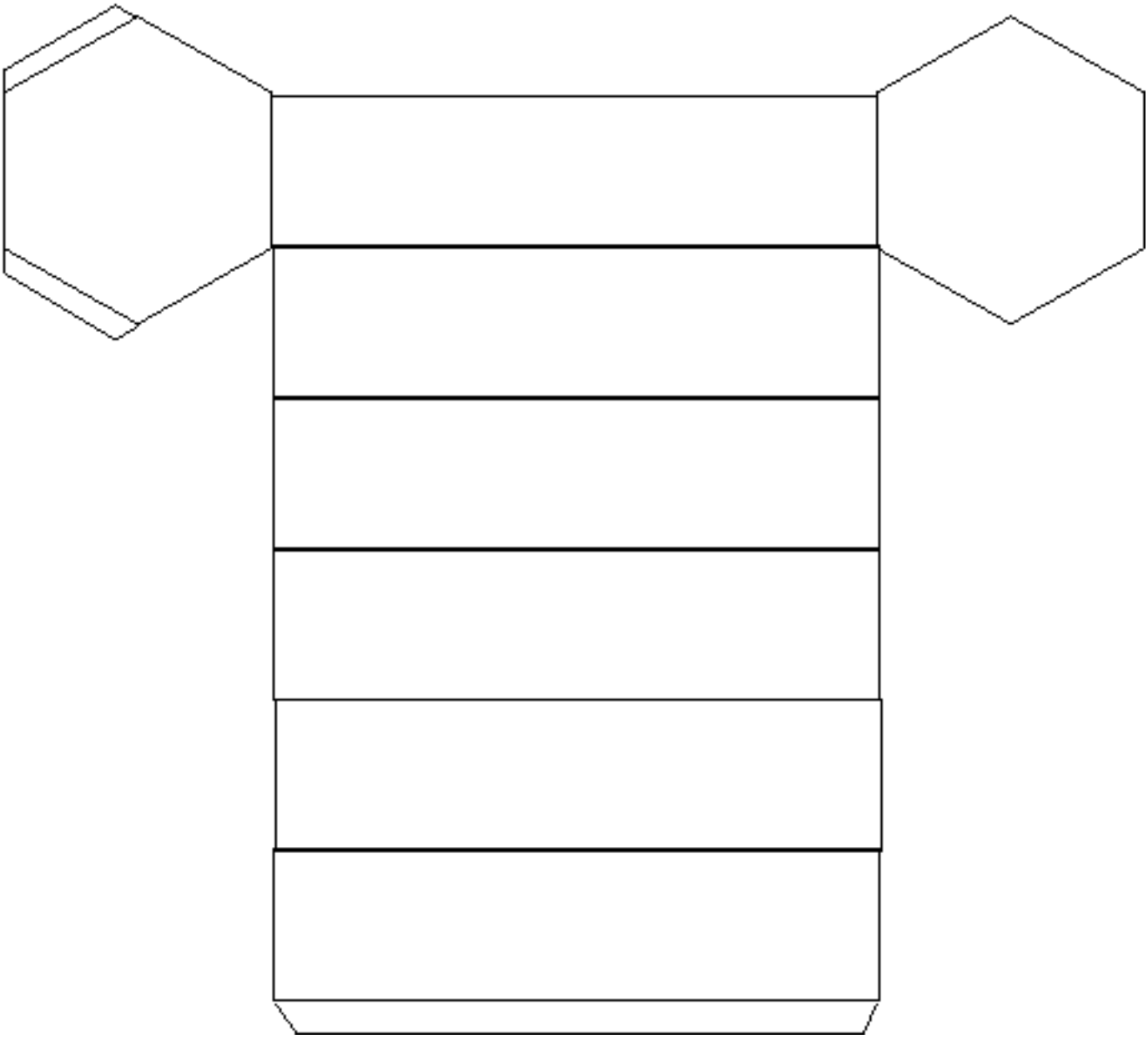
14. two DIFFERENT nets that both form the SAME triangular pyramid. Check your answer by cutting out and folding the nets and comparing the two shapes.

15. as many different nets of a cube that you can. Check your nets by cutting out and folding them to form cubes. Compare your solutions with a friend's.

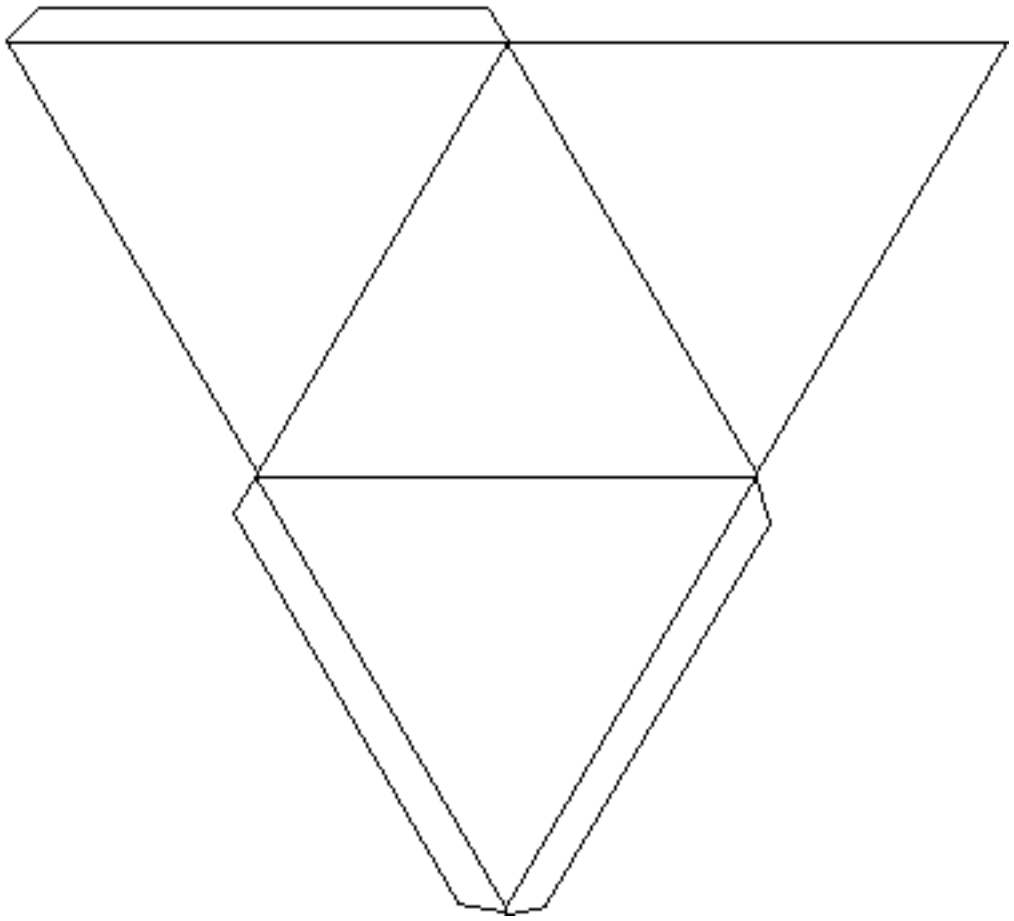
Triangular Prism



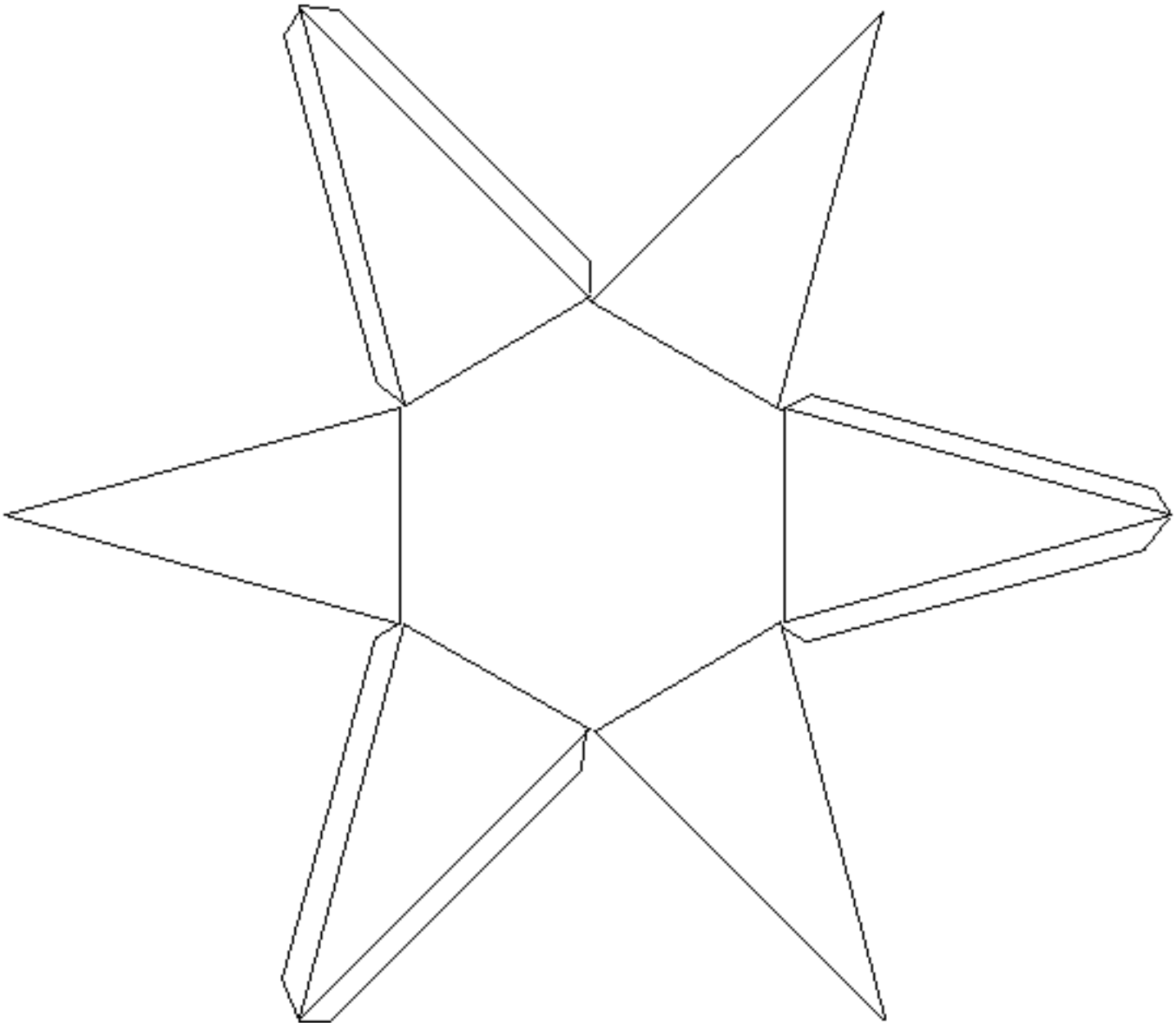
Hexagonal Prism



Triangular Pyramid



Hexagonal Pyramid



Graphing Linear Equations

Suggested grade level: 8, 9 or 10

Corresponding software: *Mathville SkiQuations*, *Graph Match* activity

Curriculum expectations addressed:

* Identify graphs and equations of lines in the form y = mx + b, y = b, x = a
* Recognize the graph characteristics of slope properties such as steepness, direction, positive or negative rate of change
* Calculate y as a function of x
* Complete a table of values from a graph

Prerequisites: a basic understanding of slope and plotting points on the xy-plane

Materials required: Copies of the following blackline worksheet and pencils

Suggestions for use: On the worksheet, students are required to graph four lines, each with a slope of 0, undefined, 1 or -1. Students should then write the equation of their line in the box provided and check their work by completing a table of values and plotting the points.

Variations and extensions: Do worksheets for other slopes (1/2 or -1/2, 2 or -2, etc.) or start by filling in the equation box and have the students complete the graph, table of values and slope. Have the students compare the graphs that they do and discuss their similarities and differences. Challenge the students to create their own examples.

Graphing Worksheet

Graph a line with a slope = 0 .

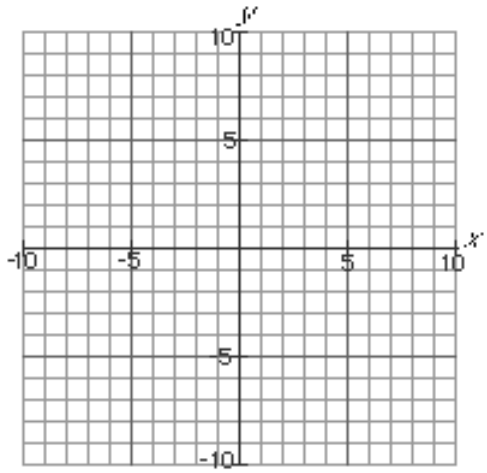


Table of Values

x	y

Equation of your line:

Check your equation by filling in the table of values above and plotting the points.

Graph a line with an undefined slope .

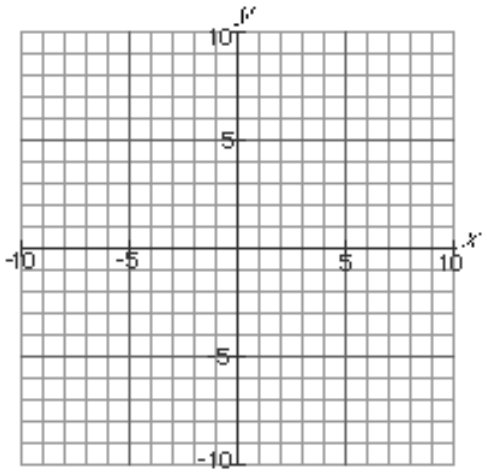


Table of Values

x	y

Equation of your line:

Check your equation by filling in the table of values above and plotting the points.

Graph a line with a slope = 1 .

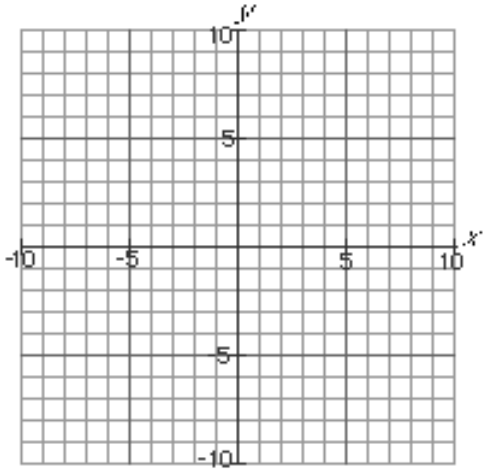


Table of Values

x	y

Equation of your line:

Check your equation by filling in the table of values above and plotting the points.

Graph a line with a slope = -1 .

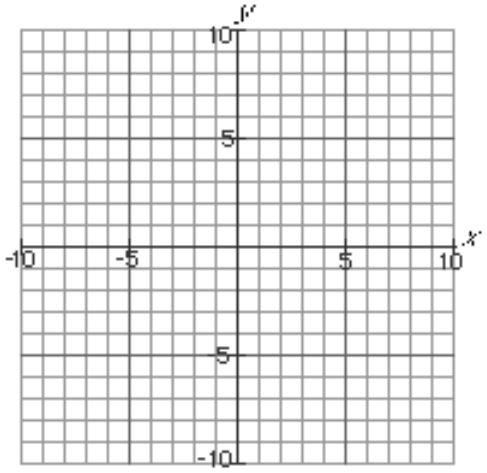


Table of Values

x	y

Equation of your line:

Check your equation by filling in the table of values above and plotting the points.

More worksheets will be added shortly.

Come back and download a new version in a week or two!